

### **REMARKS**

Applicants acknowledge the withdrawal of the finality of the previous Office Action and entry of Applicants' submission. Claims 1-17 and 33-36 are pending in this application. In view of the above amendments and the following Remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections for the reasons discussed below.

#### **I. REJECTION UNDER 35 U.S.C. § 101**

The Office Action maintains its rejections under 35 U.S.C. § 101 "because the disclosed invention is wholly inoperative and therefore lacking credible utility." Office Action at page 2. Applicants respectfully traverse these rejections and maintain that these rejections should be withdrawn for all of the reasons discussed in the responses of September 15, 2004 and November 5, 2007, which are herein expressly incorporated by reference in their entirety.

#### **II. REJECTION UNDER 35 U.S.C. § 112, FIRST PARAGRAPH**

The Office Action also maintains its rejections under 35 U.S.C. § 112, first paragraph, "as containing subject matter which was not described in the specification in such a way to enable one skilled in the art to which it pertains, or with which it is most nearly connected to make and/or use the invention." Office Action at page 4. Applicants respectfully traverse this rejection and maintain that these rejections should be withdrawn for all of the reasons discussed in the responses of September 15, 2004 and November 5, 2007, which are herein expressly incorporated by reference in their entirety.

#### **III. RULE 132 DECLARATIONS**

In the Office Action, the Examiner takes issue with all three Rule 132 Declarations submitted on November 5, 2007. Specifically, for example, the Examiner "questions the fact" whether each of the three declarants is "a disinterested third party with no financial interest in the assignee" because "he [and/or she] is receiving \$200/hr plus reasonable expenses for his [and/or her] time spent on the declaration." The Examiner therefore concludes that if the declarants are

“receiving monetary compensation, there is clearly a financial interest in the assignee.” *See* Office Action at pages 5, 7, and 8. Applicants strongly disagree.

In determining the probative value of an expert opinion, the general rule is that the Examiner must consider, *inter alia*,

“the interest of the expert *in the outcome of the case...*”

(MPEP at 716.01(c)(III)(emphasis added). Applicants submit that the declarants have no interest in the outcome of the pending application and/or a direct financial stake in the success of the patent. In order to determine whether a declarant has an interest in the outcome of the pending application, the courts will look to see if the declarant has any ongoing mutually beneficial relationship with the assignee, such as past or present employment, own stock in assignee’s company, or has previously acted as a consultant for assignee’s company. *See Ferring B.V. v. Barr Labs., Inc.*, 437 F.3d 1181, 2006 U.S. App. LEXIS 3554 (Fed. Cir., 2006).

As stated in each of the Rule 132 declarations, each of the declarants acted only in the capacity as consultants for the assignee and only received payment that is customary for consultants. Therefore, since none of the declarants have an ongoing beneficial relationship with the assignee, the declarants cannot be considered to have a financial interest in the outcome of the case. Notwithstanding, although the interest of the third party should be considered by the Examiner to determine the probative value of the declaration, the declaration cannot be disregarded solely for that reason. *See* MPEP at 716.01(c)(III)(“[A]n affidavit of an applicant as to the advantages of his or her claimed invention, while less persuasive than that of a disinterested person, cannot be disregarded for this reason alone).

#### **A. The Rondorf Declaration**

The Examiner asserts that the declaration by “Neil E. Rondorf...is insufficient to overcome the rejections of claims 1-17 and 33-36 based upon 35 U.S.C. 101 and 35 U.S.C. 112, first paragraph as set forth in the last Office Action.” Office Action at page 5. Specifically, the Examiner alleges that “the applicants were not in possession of the technology and resources to make and or use the claimed submersibles” because the “applicant’s [sic] state on the record that

“submersibles of the kind required for this application do not presently exist” (page 13, lines9-12 [sic]).” *Id.* at 6. Applicants strongly disagree.

Indisputably, the specification is replete with examples of submersible payload delivery systems as well as systems that may be retrofitted to implement the claimed invention. The specification specifically states at para. 0034:

at least three possible types of submersible payload delivery systems are disclosed to implement mobile inception strategies.

These embodiments are:

- (1) An all-purpose submersible that comprises gas storage vessels, gas release mechanisms, manifold hoods, ballast tans for buoyancy control, and a submersible maneuvering system, which includes: communications, power supply, propulsion mechanisms, and position/attitude control surfaces.
- (2) A carrier delivery system whereby a dedicated maneuvering submersible has fixed “wings” to carry gas storage and release vessels. The ballast system remains in the maneuvering submersible.
- (3) A towed delivery system whereby a dedicated maneuvering submersible tows a series of gas storage and release submersibles, which contain ballast tanks for buoyancy control as gas is released.

Furthermore, the specification even provides drawings (i.e., Figures 12-15) which illustrate examples of various types of submersibles that could be used to carry out the claimed invention. Specifically, for example, Figure 12 illustrates an “All-Function Submersible,” Figure 13 illustrates a “Carrier Delivery Submersible,” Figure 14 illustrates an alternative “Carrier Delivery Submersible,” and Figure 15 illustrates a “Towing Delivery Submersible.” Additionally, the specification provides more than adequate description of these four payload delivery systems, which may be self-powered, manned or unmanned submersibles. (*See e.g., Id.* at para. 0104-0109). Indeed, the disclosure sufficiently illustrates that the Applicants were in possession of the technology and resources to make and or use the claimed submersibles.

To further support that the claimed invention complies with the requirements of 35 U.S.C. § 112, first paragraph, Applicants submitted the Rondorf declaration. In his declaration, Captain Rondorf presented persuasive arguments, supported by suitable proofs, that one skilled in the art would have been able to make and use the invention using the disclosure as a guide.

For example, in the Rondorf Declaration, Captain Rondorf states that the type and number of submersibles needed for implementing the claimed invention could be readily ascertained by using the amount of direction provided for in the specification and the knowledge of one skilled in the art at the time of filing the application without any undue experimentation. *See* Rondorf Declaration at para. 5.

In his Declaration, Captain Rondorf cites several examples of submersibles that have been converted for alternative tasks, such as converting a submersible ballistic missile hull to a submersible ship guided missile hull. Captain Rondorf provides these examples to demonstrate that the information needed to retrofit an existing submersible or submarine to carry out the claimed invention (i.e., converted to carry and disperse carbon dioxide) would have been known to those of ordinary skill in the art. Specifically, Captain Rondorf states:

[H]ere, the missile tubes were converted for use as [a] conventional missile launcher. In addition, inserts were developed to fit inside the former missile tube yielding an alternative mission payload capacity. The converted tubes for alternative payloads are designed to equalize with the pressure of the sea and allow the deployment of the payload with the upper hatch open and no pressure differential. ***Thus, the bubble method for gas release would be very compatible with this operating concept.***

*Id.* at para. 8 (emphasis added). It is irrelevant that the examples of the submersible conversions provided by Captain Rondorf are not submersibles that can “carry and disperse large amounts of liquid carbon dioxide” as the Examiner asserts. The Rondorf Declaration clearly illustrates that one skilled in the art would have been able to make and use the invention using the disclosure as a guide.

Finally, the Examiner alleges that “there appears to be a flaw in Captain Rondorf’s reasoning on how many submersibles would be needed in order to carryout the claimed invention,” because Captain Rondorf “bases his calculations on using a Typhoon hull which has a volume of approximately 73,000 cubic meters” rather than the “vessel NR-1 which has an approximately [sic] volume of 32,000 cubic feet (917 cubic meters).” Office Action at page 6. There is no flaw in Captain Rondorf’s reasoning.

Captain Rondorf used calculations based upon conversion of a Typhoon hull to gas carrying capacity because this would be the most efficient and logical way of implementing the claimed invention. As he explains in his declaration:

the United States and Russia have successfully converted submarine hulls from one use to another... Therefore, the conversion of an entire section of a submarine from its original use to a gas release volume is entirely within the capacity of shipyards within the United States and other developed industrial nations. The normal bulkhead construction allows for water tight integrity in each compartment in order to allow the compartment to be isolated in the vent of flooding. Thus this design technique can be used to provide pressure isolation to the proposed gas volume hull section. Using this approach, *the Typhoon hull form would be the preferred choice for conversion to a gas carrying capacity.*

*Id.* at para. 9 (emphasis added). Captain Rondorf provides the example of the conversion of the vessel NR-1 merely to show that conversions of submersible from one use to another have been done. Therefore, “the calculations presented on page 5 of the declaration are” *not off* “by a factor of about 73” as the Examiner alleges.

Accordingly, in view of the above remarks. Applicants assert that the Rondorf Declaration is sufficient to overcome the rejection of claims 1-17 and 33-36 under 35 U.S.C. § 112, first paragraph and 35 U.S.C. § 101 and that the Applicants were in possession of the technology and resources necessary to make and use the claimed submersibles.

#### **B. The Singleton Declaration**

In the Office Action, the Examiner alleges that the Singleton Declaration is insufficient to overcome the rejection of claims 1-17 and 33-36 based upon 35 U.S.C. 101 and 35 U.S.C. 112, first paragraph. The Applicants strongly disagree.

Specifically, the Examiner alleges that the “present invention does not use the exact methods or diffusers that are being used in Ms. Singleton’s calculations.” Office Action at page 7. There is no requirement that Ms. Singleton use the *exact* methods or diffusers as disclosed in the claimed invention. The MPEP only requires that the Examiner compare the methods used in the experiments of the declaration with the methods disclosed in the application. The experiments in the declaration merely need to use the guidance in the specification as filed and

must correlate to the scope of the claimed invention. Specifically, for example, the MPEP at § 2164.05 states:

[H]owever, the examiner should carefully compare the steps, materials, and conditions used in the experiments of the declaration with those disclosed in the application to make sure that they are commensurate in scope; i.e., that the experiments used the guidance in the specification as filed and what was well known to one of skill in the art. Such a showing also must be commensurate with the scope of the claimed invention, *i.e., must bear a reasonable correlation to the scope of the claim* (emphasis added).

Indeed, it is clear in Ms. Singleton's declaration that she used the disclosure as a guide to arrive at her estimate of the gas flow rate and the quantity of gas required to lower the temperature of the sea surface. Specifically, Ms. Singleton stated:

[T]his declaration provides support for an initial order-of-magnitude estimate of the gas flow rate and the quantity of gas required to induce an adequate upwelling flow rate to lower the temperature of the upper sea surface, using the amount of direction provided for in the specification in combination with the knowledge of one skilled in the art at the time of filing the application, such as the use of two existing bubble-plume models.

Singleton Declaration at para. 5.

Based upon the design example in the patent application, it was assumed that the diffusers would be located at about 300 m depth when bubbling. The patent application states that carbon dioxide is the preferred gas, so model calculations focus on this compound.

*Id.* at para. 6.

And furthermore, the experimental models provided in her declaration certainly have more than a reasonable correlation to the scope of the claims (i.e., independent claim 1 recites "...the gas being released during the period of time, the gas forming bubbles which rise in a plume toward a surface of the ocean, the plume entraining water from at least the-depth and upwelling the

entrained water toward the surface of the ocean to cool the surface of the ocean...”).

Specifically, Ms. Singleton stated:

Using these initial and boundary conditions, each model was run over a range of applied gas flow rates (2,000–20,000 Nm<sup>3</sup>/s) to a single diffuser system or unit. Because the intent of the apparatus is to cool surface waters, the lowest gas flow rate that upwelled water to and detrained at the surface was selected. The gas flow rates that induced plumes to the surface were 10,500 and 12,500 Nm<sup>3</sup>/s for the linear and circular diffusers, respectively. The depth of the 26°C isotherm, the temperature below which hurricane development is hampered, was 81 m. Therefore, only plume induced flow rates from 300 to 81 m depth are considered as effective upwelling flow rates. For the previously stated gas flow rates, the plume water flow rates at the depth of 26°C isotherm are 51,900 and 51,300 m<sup>3</sup>/s for a single linear and circular diffuser, respectively. These flow rates represent the upwelling flow rate from deeper water into the effective epilimnion or surface layer. Even though the plume continues to rise through the epilimnion and entrain ambient water, plume induced flow that occurs within the effective epilimnion does not contribute to the upwelling into this volume. ***It would be expected that the artificial upwelling of the deep, cold seawater to the sea surface layer by the bubble-driven plume would create an upper ocean layer region of sufficiently lower temperature.***

*Id.* at para. 8. (emphasis added).

The Examiner also alleges that “the applicants even go as far to admit, that the bubble plume methods of their invention have never been used in open-ocean,” concluding that “if that is truly the case, then the calculation of Ms. Singleton cannot properly be used to model the present invention.” Office Action at page 7. Again, the Applicants strongly disagree. First, there is no requirement that an applicant have actually reduced the invention to practice prior to the filing date. Specifically, the MPEP at § 2164.02 states:

An applicant need not have actually reduced the invention to practice prior to filing... The Court held that “The mere fact that something has not previously been done clearly is not, in itself, a sufficient basis for rejection all applications purporting to disclose how to do it.”

Secondly, the Examiner's conclusion that Ms. Singleton's calculations cannot properly be used to model the present invention is nonsensical. There is no requirement that Ms. Singleton "prove how the surface temperature of the ocean of a given area would be affected any that amount of upwelling" as the Examiner alleges. Office Action at page 7. According to the MPEP at § 2164.03 states:

The "predictability or lack thereof" in the art refers to the ability of one skilled in the art to extrapolate the disclosed or known results to the claimed invention. If one skilled in the art can readily anticipate the effect of a change within the subject matter to which the claimed invention pertains, then there is predictability in the art.

In her declaration, Ms. Singleton modified two well-known existing bubble-plume models so the models would be applicable to open-ocean conditions. For example, Ms. Singleton states:

Because they [the models] are used for lake oxygenation studies, the solubility (Weiss, R. ET AL., Mar. Chem. 1974, 2, 203-215) and mass transfer coefficients (Clift, R., ET AL., BUBBLE, DROPS, AND PARTICLES New York, NY, 1978) of the bubble-plume models were ***modified for carbon dioxide, and the effect of dissolved carbon dioxide on water density was included*** (Weiss ET AL, *supra*).

Singleton Declaration at para. 6. (emphasis added).

In her declaration Ms. Singleton stated that the artificial upwelling of the deep, cold seawater to the sea surface layer by the bubble-driven plume would create an upper ocean layer region of sufficiently lower temperature based upon her own calculations combined with the knowledge generally known in the art. *See e.g., Id.* at para. 8. Therefore, since Ms. Singleton was able to readily extrapolate the disclosed results of the claimed invention, there is predictability in the art.

Finally, the Examiner alleges that Ms. Singleton calculates that "each submersible would need to have approximately 12 diffusers connected to its outer shell," concluding that the "specification appears to only have support for each submersible having a single diffuser." Office Action at page 8. The Examiner's allegation is inaccurate. The specification discloses



several examples illustrating the number of diffusers that may be mounted on the submersibles.  
*See e.g.*, figures 13-16 of the specification. Notwithstanding,

[A]s long as the specification discloses at least one method for making and using the claimed invention that bears a reasonable correlation to the entire scope of claim, then the enablement requirement of 35 U.S.C. § 112 is satisfied.

MPEP at § 2164.01(b)

However, irregardless of the exemplary number of diffusers disclosed in the specification, it is clear from Ms. Singleton's declaration that the number of diffusers needed for implementing the claimed invention were readily ascertained by using the amount of direction provided for in the specification and the knowledge of one skilled in the art without any undue experimentation thereby satisfying the enablement requirement of 35 U.S.C. § 112, first paragraph.

Accordingly, in view of the above remarks. Applicants assert that the Singleton Declaration is sufficient to overcome the rejection of claims 1-17 and 33-36 under 35 U.S.C. § 112, first paragraph and 35 U.S.C. § 101.

### **C. The Ginis Declaration**

In the Office Action, the Examiner alleges that the Ginis Declaration is insufficient to overcome the rejection of claims 1-17 and 33-36 based upon 35 U.S.C. 101 and 35 U.S.C. 112, first paragraph. The Applicants strongly disagree.

The Examiner alleges that Dr. Ginis "does not address how the claimed invention is capable of reducing the sea surface temperature by 2.5 degrees, or if the present invention contains a disclosure sufficient to enable one of ordinary skill in the art to reduce the surface temperature by 2.5 degrees." Office Action at page 8. The Examiner's requirement is not commensurate with the scope of the claimed invention.

As a preliminary matter, as disclosed by the specification, reducing the sea surface temperature by 2.5°C would do more than reduce the intensity of the hurricane, it would completely eliminate the hurricane. Specifically, the specification states at para. [0005]:

Numerical modeling studies at the Massachusetts Institute of Technology suggests that reduction of sea surface temperatures by 2.5°C in the storm's central core would eliminate the thermodynamic conditions that sustain hurricanes. Other numerical model studies by independent researchers corroborate these results.

Independent claim 1 recites to "cool[ing] the surface of the ocean, the cooled surface reducing the intensity of the hurricane..." Therefore, the Examiner's requirement that the applicant must demonstrate reducing the sea surface temperature by 2.5°C is not commensurate with the scope of claims; i.e., the claimed invention is directed to *reducing* the intensity of a hurricane, and not *eliminating* a hurricane. Notwithstanding, as discussed above, the Singleton Declaration provided sufficient evidence to establish that the artificial upwelling of the deep, cold seawater to the sea surface layer by the bubble-driven plume would create an upper ocean layer region of sufficiently lower temperature.

Applicants submitted the Ginis Declaration to evidence that the effect of air-sea interaction as a negative feedback on tropical cyclone development and intensity has been well established and that tropical cyclones experience a noticeable reduction of intensity owing to their coupling with the ocean. In his declaration, Dr. Ginis demonstrated by numerical experiments that when a hurricane encounters cooler water surface temperatures, i.e., 1°C and 2°C, the wind strength of the hurricane was reduced. Specifically, Dr. Ginis stated:

The temperature anomalies (SSTA) underneath the hurricane core, defined as a circular area around the storm center with  $R=100$  km, are shown in Figure 3. The SSTA are greatly reduced when the hurricane crosses the cooled regions. Evolution of hurricane central pressure and maximum winds in the numerical experiments are shown in Figure 4. In both sensitivity experiments the hurricane intensity was reduced after the storm encounters the cooled regions. The maximum winds were reduced from about 145 kts to about 135 kts (6% reduction) in the 1°C swath experiment and to about 130 kts (10% reduction) in the 2°C swath experiment.

Ginis Declaration at para. 16.

I conducted an additional experiment in which the size of the 2°C cooled region was doubled along the track direction. As result, the hurricane intensity was further reduced from about 145 kts to about 120 kts (22% reduction). These sensitivity experiments clearly indicate that both the size and magnitude of the cooled area encountered by a moving hurricane make important impact on the hurricane intensity reduction.

*Id.* at para. 17.

Accordingly, in view of the above remarks. Applicants assert that the Ginis Declaration is sufficient to overcome the rejection of claims 1-17 and 33-36 under 35 U.S.C. § 112, first paragraph and 35 U.S.C. § 101.

#### **IV. CONCLUDING REMARKS**

Applicants assert that when taking all the evidence as a whole, the Rondorf Declaration, the Singleton Declaration, and the Ginis Declaration adequately demonstrate that the amount of guidance and/or direction in the application, as originally filed, teaches one skilled in the art exactly how to make or use the invention. Therefore, Applicants assert that in view of the above remarks, the arguments presented in the responses filed on September 15, 2004 and November 5, 2007, and the three Rule 132 declarations, the enablement requirement of 35 U.S.C. § 112 as and the utility requirement of 35 U.S.C. § 101 are satisfied.

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Reply to Office Action of January 28, 2008

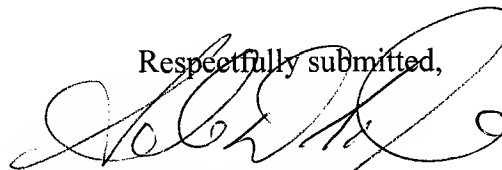
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**CONCLUSION**

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 202-481-9900.

Respectfully submitted,



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